Metabolic Requirements for Alternative Macrophage Activation

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SUMMARY

UCLA researchers in the Department of Molecular and Medical Pharmacology have discovered that Coenzyme A is a targetable requirement for anti-inflammatory macrophage differentiation.

BACKGROUND

A dysregulated immune response is a hallmark of many disease phenotypes. For instance, cancer cells can reprogram healthy cells of the innate immune cells to work in conjunction to promote cancer cell growth. There are currently a number of methods being explored to combat this reprogramming, though these methods have shown limited success. There exists an unmet need for a therapy that relies on naturally-occurring bodily substances to help combat this reprogramming either on its own or in conjunction with current standard-of-care cancer treatments such as chemotherapy.

INNOVATION

Drs. Divakaruni and Bensinger at UCLA have discovered that Coenzyme-A (CoA) is a targetable requirement for anti-inflammatory macrophage differentiation. This discovery provides a potential point of targeting for macrophage differentiation in cancer models. The identification of CoA as a target for macrophage differentiation can also be used as a point of therapy for many other diseases where an excessive anti-inflammatory response can be causative of pathology (e.g. fibrotic disease, NASH/NAFLD, etc.).

APPLICATIONS

- Elevate CoA levels to improve conditions involving excess inflammation, in cases like: parasitic infections, diet induced obesity, sepsis, rheumatoid arthritis, eczemas, allergic or atopic dermatitis, and inflammatory conditions of the eye
- Topical, subcutaneous, or intravenous application of CoA could also lead to benefits for: wound healing following surgeries, injuries, burn, or skin damage due to radiation or sunburn
- Lowering levels of CoA could help to treat: non-alcoholic fatty liver disease and hepatic steatosis, pulmonary fibrosis, cardiac hypertrophy, and certain cancers.

ADVANTAGES

- First study to show that CoA is a targetable requirement for anti-inflammatory macrophage differentiation
- Study directly suggests that drugs that could target rate-controlling enzymes in CoA biosynthesis could help to treat diseases like: fatty liver disease, non-alcoholic hepatic steatosis, pulmonary fibrosis, cardiac hypertrophy, and cancer (targets not typically used currently)
- The suggested use of increasing CoA could be strong evidence for why pre-existing supplements are good for one's health

RELATED MATERIALS

- A. S. Divakaruni, W. Y. Hsieh, L. Minarrieta, T. N. Duong, K. K. O. Kim, B. R. Desousa, A. Y. Andreyev, C. E. Bowman, K. Caradonna, B. P. Dranka, D. A. Ferrick, M. Liesa, L. Stile, G. W. Rogers, D. Braas, T. P. Ciaraldi, M. J. Wolfgang, T. Sparwasser, L. Berod, S. J. Bensinger, A. N. Murphy, Etomoxir Inhibits Macrophage Polarization by Disrupting CoA Homeostatis, Cell Metabolism, 2018.

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	11,813,277	11/14/2023	2018-388

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OTHER INFORMATION

KEYWORDS

Immune Response, Cancer, Inflammation, Parasitic Infections, Diet induced obesity, Sepsis, Rheumatoid Arthritis, Eczemas, Dermatitis, inflammatory eye disease, fatty liver disease, hepatic steatosis, pulmonary fibrosis, Coenzyme-A, Natural Target

CATEGORIZED AS

- **Medical**
  - Disease: Autoimmune and Inflammation
  - Disease: Cancer
  - Disease: Infectious Diseases
  - Therapeutics

RELATED CASES

2018-388-0

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OTHER INFORMATION

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